Context matters

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GENERAL DISCUSSION

To combat today's waste problems and the emerging scarcity of resources, recycling is crucial (Corsten, Worrell, Rouw, & Van Duin, 2013; European Union, 2014). Recycling is not only a technical, but also a behavioural issue, as it is crucial that consumers consistently separate the waste they produce (Kirchherr, Reike, & Hekkert, 2017). In this dissertation, we aimed to better understand which individual and contextual factors influence recycling, and to what extent they do so. Our focus was particularly on different roles contextual factors could play. We argued that a systematic examination of whether, how, and under which conditions contextual factors affect recycling behaviour is understudied. To address this gap, we examined how contextual factors influence recycling behaviour, and how contextual factors interact with individual characteristics, in particular biospheric values, in influencing recycling, using different methods. We argued that the context can influence recycling in three different ways. Specifically, Chapter 2 and 3 examined the context as a factor that can facilitate or inhibit recycling, Chapter 4 investigated whether the context can stimulate recycling by making people focus on the environment, while Chapter 5 studied whether the context can promote recycling by strengthening individual factors, in particular environmental self-identity. In this chapter, we discuss the main results and the theoretical and practical implications of our studies.

INDIVIDUAL AND CONTEXTUAL FACTORS INFLUENCING RECYCLING BEHAVIOUR

We first systematically examined the relative importance of individual and contextual factors in explaining recycling behaviour. To address this, we conducted a meta-analysis across 91 studies on recycling behaviour in Chapter 2 to identify the most robust and important factors that are related to recycling. A meta-analysis allows researchers to systematically review and synthesize the literature on recycling, thereby assessing the magnitude of the association between different factors and recycling.

Following the IFEP model (Steg, Bolderdijk, Keizer, & Perlaviciute, 2014; Steg, Lindenberg, & Keizer, 2016), we proposed that both individual and contextual factors can influence recycling behaviour (see Figure 1). In particular, the IFEP model states that both individual and contextual factors as well as their interaction are important to consider when aiming at better understanding pro-environmental behaviours. Individual factors may explain why in a similar situation, one person recycles and another person does not. Contextual factors can be defined as characteristics of the circumstances in which recycling behaviour takes place and may explain why one person recycles in one situation, whereas s/he does not recycle in another situation. For example, a person may be more likely to recycle his or her paper waste when it is picked up regularly from the kerb than when s/he has to bring it to a paper container that is rather far away.

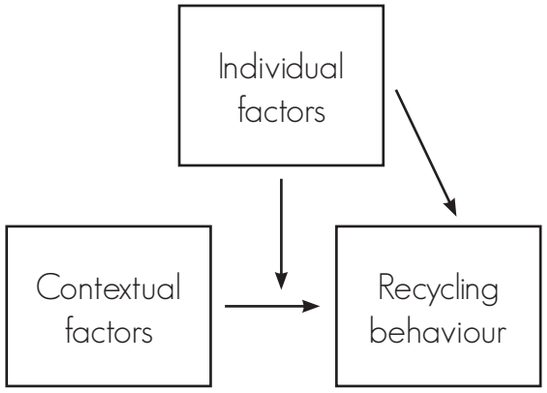

Figure 1. Conceptual model tested in this dissertation.

INDIVIDUAL FACTORS The meta-analysis revealed that different individual factors were related to recycling behaviour, including identity, past recycling behaviour, personal and social norms, perceived behavioural control, attitudes and anticipated affect. The confidence intervals around the effect sizes were relatively small, suggesting that our results were rather robust. Consistent with the compatibility principle (Ajzen, 1996), the results of the meta-analysis indicated that behaviour-specific factors, such as attitudes towards recycling, were better predictors of recycling than general predictors, such as environmental attitudes. Among the behaviour-specific factors, one's recycling self-identity and past recycling behaviour were most strongly related to recycling, suggesting that people are more likely to recycle their waste when they see themselves as the type of person who recycles, and when they did so before. Next, both personal and social (descriptive and injunctive) norms towards recycling were positively related to recycling, all showing large effect sizes. This suggests that people are more likely to recycle when they feel morally obliged to do so, and when they think that others recycle or expect them to recycle. Furthermore, a relatively higher perceived behavioural control over recycling and positive attitudes towards recycling were related to more recycling. Anticipated affect was related to recycling as well: people are more likely to recycle if they anticipate that this would yield positive feelings, or if they anticipate that not recycling would elicit negative feelings. This finding highlights the fact that besides different types of motivation to recycle, emotional factors may also be important in explaining recycling (Haidt, 2001; Taufik & Venhoeven, 2019; Zajonc, 1980). Interestingly, knowledge about how to recycle was less strongly related to recycling than the motivational factors we discussed above. This finding is in line with research showing that knowledge is not enough to change behaviour, people also need to be motivated to engage in pro-environmental behaviours (Hornsey, Harris, Bain, & Fielding, 2016; Ünal, Steg, & Gorsira, 2018).

Our results further suggest that all general individual factors were significantly related to recycling. Interestingly, the overall pattern of these results was comparable to those of individual factors that were assessed at the specific level. Yet, the relationships were generally weaker. A stronger environmental self-identity appeared to be related to more recycling, reflecting that recycling is more likely the more one sees oneself as a person who acts pro-environmentally. This finding is in line with previous research revealing that environmental self-identity is an important predictor of a wide range of pro-environmental behaviours (Van Der Werff, Steg, & Keizer, 2013a; Van Der Werff, Steg, & Keizer, 2013b; Whitmarsh & O'Neill, 2010), among which recycling (e.g., Gatersleben, Murtagh, & Abrahamse, 2014; Nigbur, Lyons, & Uzzell, 2010; Peters, Van der Werff, & Steg, 2018). Biospheric values, reflecting the extent to which people generally care about nature and the environment, were also positively related to recycling behaviour. This finding is in line with previous studies that generally showed that the more strongly individuals endorse biospheric values, the more likely they are to engage in pro-environmental behaviour such as recycling (De Groot & Steg, 2007, 2008). Furthermore, descriptive norms as well as injunctive norms towards pro-environmental behaviours in general were related to recycling, with a medium effect size. People are thus more likely to recycle when they think others act pro-environmentally, or when they think others expect them to act pro-environmentally. Knowledge about environmental problems and general environmental attitudes were also positively related to recycling behaviour. Interestingly, personal norms to engage in pro-environmental behaviour were only weakly related to recycling, suggesting that general feelings of moral obligation to act pro-environmentally hardly motivate recycling. Yet, behaviour-specific factors were more studied than general factors. Hence, one should be careful to draw strong conclusions based on these findings. Particularly the relationships between general social norms (descriptive and injunctive social norms), personal norms and recycling should be interpreted with care as they were only based on two studies.

Importantly, our results suggest that recycling not only depends on individual costs and benefits, as reflected in attitudes and perceived behaviour control, but also on moral, environmental and social costs and benefits, as reflected in environmental self-identity, values and personal and social norms. This is in line with other research showing that pro-environmental behaviour is not primarily motived by individual costs and benefit considerations, but that social norms, and normative and environmental concerns play a key role (e.g., Steg et al., 2014; Steg, Perlaviciute, & Van der Werff, 2015; Whitehead & Cherry, 2007).

CONTEXTUAL FACTORS The meta-analysis further showed that contextual factors were consistently related to recycling. More precisely, our meta-analysis revealed that the possession of a recycling bin was relatively strongly related to more recycling. The size of the neighbourhood and the distance to a drop-off location were also, although less strongly, related to recycling: bigger neighbourhoods and longer distances to drop-off stations reduce the likelihood of recycling. Interestingly, the recycling facilities in place were not significantly related to recycling. House ownership and house type were relatively weakly related to recycling, with a small to medium effect size, suggesting that that these factors are less relevant for recycling. Specifically, people owning a house are somewhat more likely to recycle than those renting a house, while people living in a single-family house are somewhat more likely to recycle compared to people living in an apartment.

Building on the results of the meta-analysis, we developed three empirical follow-up papers. In

these papers, we particularly addressed three points that the meta-analysis revealed to be important to consider. In particular, the number of studies including contextual factors was low and the confidence intervals of the effect sizes were rather large, suggesting that we can be less confident about the relationship between contextual factors and recycling. In view of this result, we systematically examined whether, how, and under which conditions contextual factors affect recycling behaviour. Particularly, as will be further explained below, we tested three possible ways of how contextual factors may affect recycling in Chapter 3, 4, and 5.

Next to the direct relationships between either individual or contextual factors and recycling behaviour, the IFEP model (Steg et al., 2014; Steg et al., 2016) suggests that individual and contextual factors may also interact in influencing recycling behaviour (see Figure 1). Interestingly, the interplay between individual and contextual factors has hardly been studied, with a few exceptions (Best & Kneip, 2011; Tabernero, Hernández, Cuadrado, Luque, & Pereira, 2015; Vining & Ebreo, 1992). Studying the interplay of individual and contextual factors may reveal under which conditions individual and contextual factors are most likely to affect recycling. In Chapter 3 and 4, we proposed and tested whether and how individual and contextual factors interact in influencing recycling behaviour (see Figure 1). Specifically, we aimed to address this gap in the literature by examining the interplay of different contextual factors and biospheric values as an individual factor in Chapter 3 and 4.

Moreover, the results of the meta-analysis revealed that recycling is operationalized in different ways and that relationships between individual and contextual factors and recycling may vary depending on the conceptualisation of recycling. Specifically, intentions to recycle seem to be better explained than self-reported recycling and particularly better than observed recycling behaviour. This result may point to an intention-behaviour gap, suggesting that motivation is more likely to be related to intentions than to actual behaviour (Kollmus & Agyeman, 2002). This suggests that future research should clearly distinguish between the different outcome variables as this may lead to different results. Moreover, it highlights the importance of not only studying intentions to recycle and self-reported recycling behaviour but to also assess actual recycling behaviour. In response to this finding, we examined actual recycling behaviour in all three empirical chapters next to intentions to recycle and self-reported recycling behaviour.

In three empirical articles, we addressed the points that need more attention based on the meta-analysis by examining different ways in which contextual factors can influence recycling, and whether effects of contextual factors depend on individual factors, particularly biospheric values. We tested this across different indicators of recycling. In the following, we will describe the main findings of these studies and the implications for theory and practice.

PERCEIVED FEASIBILITY OF RECYCLING

We proposed that the first way of how the context may influence recycling behaviour is by facilitating or inhibiting recycling behaviour. In this respect, the collection system in place may be a relevant contextual factor (Derksen & Gartrell, 1993; Best & Kneip, 2011; Best & Kneip, 2019). We reasoned that particularly people's perceptions of the ease of using the collection system are likely to affect their recycling behaviour (cf. Weber, 2018). Specifically, we proposed that the perceived ease of using the collection system affects recycling behaviour indirectly, via the perceived feasibility of recycling, which reflects the perceived ability to recycle (cf. IPCC, 2018) and the perceived ease of recycling (Rodgers, Conner, & Murray, 2008; see Figure 2).

We further reasoned that perceived feasibility of recycling interacts with biospheric values in affecting recycling behaviour (see Figure 2). Specifically, we tested whether the low-cost hypothesis (Diekmann & Preisendörfer, 2003) or the A-B-C model (Guagnano, Stern, & Dietz, 1995; Stern, 2000) is more plausible in explaining the interaction effect between perceived feasibility of recycling and biospheric values on recycling behaviour. The low-cost hypothesis proposes a linear relationship between biospheric values and recycling, with the relationship becoming stronger with increasing perceived feasibility of recycling. That is, biospheric values would be more strongly related to recycling, the more feasible people perceive recycling to be. In contrast, the A-B-C model proposes a curvilinear relationship between biospheric values and recycling behaviour, with the relationship being strongest when recycling is perceived as moderately feasible. When recycling is perceived as very feasible, people would recycle anyway, irrespective of the strength of their biospheric values. If recycling is perceived as very unfeasible, individuals would generally not recycle, irrespective of their endorsement of biospheric values. We tested our reasoning in two questionnaire studies conducted in three municipalities with different collection systems, thereby focusing on different waste streams, including paper, glass, plastics and organic waste, as well as on recycling behaviour in general. We collected data on self-reported recycling and on actual recycling behaviour, that is, the total amount of organic waste recycled.

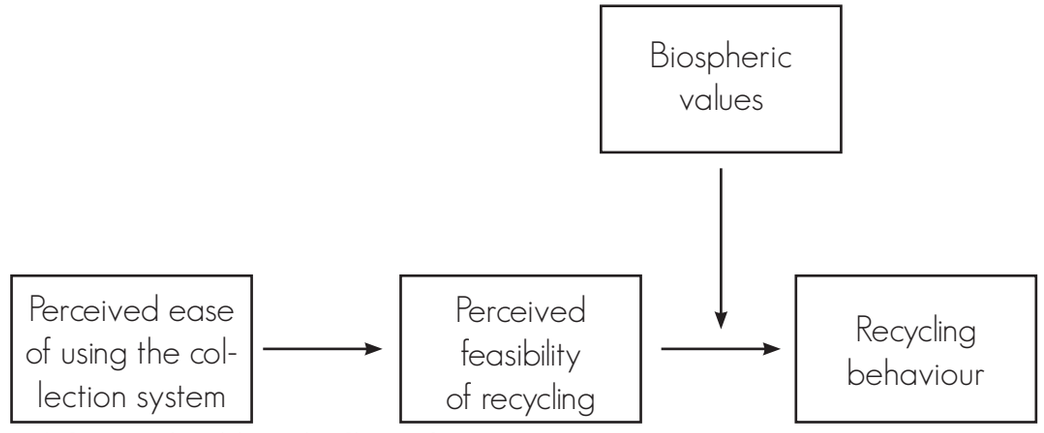

Figure 2. Conceptual model tested in Chapter 3

In line with our expectations, we found that the perceived ease of using the collection system was indirectly related to recycling behaviour via perceived feasibility of recycling. Specifically, the easier one perceived the collection system to use, the more feasible one perceived recycling to be, which in turn was associated with more recycling. This result implies that the perception of the context, in this case the perceived ease of using a collection system, may affect the perception of the feasibility of the corresponding behaviour, which in turn influences the behaviour. We found this relationship for both indicators of perceived feasibility of recycling, namely for the perceived ability to recycle (Study 1) and for the perceived ease to recycle (Study 2). Notably, we found similar results in two cities with different collection systems, thereby examining different waste streams, including paper, glass, plastics and organic waste and recycling behaviour in general. This indicates that our results are rather robust. The results suggest that it is important to consider individuals' perceptions of the context, in this case the ease of using the collection system. Indeed, within the same collection system, individuals seem to perceive the ease of using the collection system differently, which, in turn, leads to different recycling behaviours.

Interestingly, the perceptions of the ease of using the collection system and the feasibility of recycling were only weakly related to biospheric values, suggesting that how people perceive the context does not depend on people's motivation to recycle. This is an important contribution to the literature. As differences in perceptions of the ease of using the collection system do not seem to be strongly rooted in individual factors, notably biospheric values, an interesting question for future research is to investigate why these differences in perceived feasibility of recycling occur.

Furthermore, both studies revealed an interaction effect between perceived feasibility of recycling and biospheric values on recycling behaviour, in addition to the main effects of perceived feasibility of recycling and biospheric values. In both studies, stronger biospheric values seemed to particularly promote self-reported recycling behaviour when recycling was not perceived as very feasible. When recycling was perceived as very feasible, individuals recycled irrespective of the strength of their biospheric values. These results do not support the low-cost hypothesis (Diekmann & Preisendörfer, 2003), articulating that the predictive power of biospheric values would become stronger when perceived feasibility of recycling increases. At a first glance, the findings do not seem to support the A-B-C model either (Guagnano et al., 1995; Stern, 2000), which articulates a curvilinear U-shaped relationship with biospheric values and recycling. Specifically, the A-B-C model predicts that the relationship is strongest when one perceives recycling as moderately feasible. Yet, a careful examination of the mean scores of perceived feasibility indicated that our findings may support the A-B-C model. Notably, the mean scores of perceived feasibility of recycling were rather high in both studies. Participants generally perceived recycling of all types of waste as rather feasible, and only a few participants indicated to perceive recycling as not very feasible. One may therefore argue that our data do not allow to draw conclusions about the relationship between biospheric values and recycling behaviour when people perceive recycling as rather unfeasible. As such, our findings support one half of the U-shaped function of the A-B-C-model, namely that biospheric values were not significantly related to recycling when recycling was perceived as very feasible, but they were related to recycling when it was perceived as moderately feasible, thus towards the middle range of the feasibility continuum. Our results are in line with a study on the relationship between personal norms and acceptability of car-reduction policies, suggesting that personal norms, a different individual factor, are not significantly related to acceptability of these policies when the policy implies very low costs for the individual, while personal norms are significantly related to policy acceptability when the policy implies moderate costs for the individual (Keizer, Sargisson, Van Zomeren, & Steg, 2019).

Interestingly, we could not replicate our results for actual recycling behaviour, in particular the total amount of organic waste collected. Specifically, neither the perceived ease of using the collection system nor the perceived feasibility of recycling and biospheric values were related to the total amount of organic waste recycled. The finding is in line with previous literature suggesting that it is easier to predict self-reported recycling behaviour than actual recycling behaviour (cf. Kollmus & Agyeman, 2002; Geiger et al., 2019). Yet, a more plausible explanation could be that the indicator we used to measure actual recycling behaviour was not ideal. Notably, we used the weight of organic waste participants disposed of as an indicator of recycling, assuming that the more organic waste one discardes, the more pro-environmental a person is. Yet, the total amount of organic waste recycled does not account for waste prevention behaviour, which is generally considered as more sustainable than recycling behaviour (European Union, 2015; Price & Joseph, 2000). Using the weight of organic waste assumes that the more waste individuals dispose of, the better they recycle. Yet, more organic waste may not always mean that one is more pro-environmental, as more organic waste may mean that one has thrown away more food, implying that one has acted in a more environmentally harmful way. Similarly, individuals may have composted their waste rather than disposing of it in an organic collection system, which is also more pro-environmental.

PACKAGING DESIGN MAKING PEOPLE FOCUS ON THE ENVIRONMENT

In Chapter 4, we tested a second approach of how the context may influence recycling behaviour, namely by making people focus on the environment. We proposed that a packaging design can affect recycling by making people focus on the environment. Research on design for behaviour change had shown that design can drive socially desirable behaviour change (Tromp, Hekkert, Verbeek, 2011; Tromp & Hekkert, 2016; Niedderer et al., 2014), but little is known about why and under which conditions behaviour change is most likely. We proposed that a sustainable packaging design may not

only affect purchase behaviour, as revealed in previous research (Magnier & Schoormans, 2017; Magnier, Schoormans, & Mugge, 2016, Pancer, McShane, & Noseworthy, 2015; Steenis, Van Herpen, Van der Lans, Ligthart, & Van Trijp, 2017), but may also stimulate recycling. We tested our reasoning in three studies. We conducted two online studies among a student and a general sample of the Dutch population to examine the main and interaction effects of packaging design and biospheric values on likelihood of recycling. Moreover, we conducted a field experiment in which we tested the effects of packaging design and biospheric values on actual recycling behaviour. To develop the packaging, we worked closely together with designers. We explained our theoretical reasoning to these designers, in particular, that we expected that a packaging design can affect recycling by making people focus on the environment. The designers translated our theoretical input into packaging designs that are aimed at making individuals focus on the environment.

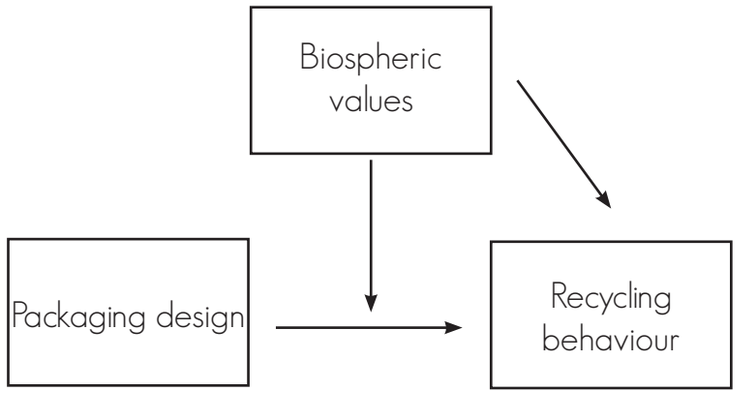

Figure 3. Conceptual model tested in Chapter 4

Our results suggest that packaging design can encourage pro-environmental behaviour, in our case recycling, when it makes people focus more on the environment, particularly when people moderately strongly to strongly endorse biospheric values. However, we did not find this effect for the biscuit package, in which case the environmental designs were adjustments of the existing packaging. Yet, we found a significant effect of the environmental design on both likelihood and actual recycling of the cup. In this case, we used a novel design rather than adjusting an existing design. It is therefore likely that the effects are more likely to occur among novel packages and products that people are unfamiliar with. Adjusting existing designs of familiar products and packages may not be that effective in making people focus on the environment. Future research is needed to test whether using a novel design is indeed more successful in making people focus on the environment and if so, why this is the case. We suggest to particularly examine the role of novelty and familiarity with the package and the product in this process.

As the effect of the packaging design of the cup on recycling was more pronounced among individuals with moderately strong to strong biospheric values, it seems as if the environmental design of the cup succeeded in making people focus more on the environment, whereas the biscuit package did not. In case of the cup, participants with moderately strong to strong biospheric values acted more in line with their values. Our results partly support the IFEP model (Steg et al., 2014; Steg et al., 2016), suggesting that contextual factors, including design, can make people focus on the environment, thereby promoting pro-environmental behaviours, amongst these recycling. Our results suggest that design particularly stimulates recycling when the design used is novel. Yet, we did not find consistent support for our notion that biospheric values are related to more recycling. Future research could examine the role of biospheric values in the process of making people more focused on the environment.

Interestingly, the interaction effect of packaging design and biospheric values on recycling was not curvilinear. Particularly, the effect of packaging design was more pronounced among participants with moderately strong to strong biospheric values. This is an interesting finding as we expected the effect to be particularly pronounced among individuals with moderately strong biospheric values and less when people weakly or strongly endorse biospheric values. A possible explanation may be that also individuals with strong biospheric values may have needed a prompt that the cup can be recycled, as not all to-go cups can be consistently recycled due to the different materials used in the packaging. Future research could investigate under which conditions the interaction effect of packaging design and biospheric values is curvilinear and under which conditions the effect is linear. In this article, we tested the effect of packaging design that makes people focus on the environment and whether the likelihood of recycling depends on biospheric values via moderation. As we did not include any process variables, we can only assume that the packaging design made people focus on the environment. Future research could investigate if environmental packaging designs indeed make people focus more on the environment, by using both implicit and explicit measures of the extent to which they make people focus on the environment.

The effect of the cup was not only found on self-reported recycling but also on actual recycling. This is an important finding as research usually finds that it is more difficult to predict actual behaviour than self-reported (recycling) behaviour (Geiger, Steg, Van der Werff, Ünal, 2019; Kollmus & Agyeman, 2002). This suggests that our results are rather robust as they hold across different operationalisations of recycling, namely across self-reported and actual recycling in a natural setting. If anything, the effect seemed to be even stronger for actual recycling behaviour in Study 3 than for self-reported behaviour in Study 2. A reason for this may be that participants make a deliberate choice in a questionnaire. Consequently, also participants in the control condition may have become aware of the importance of recycling.

Hence, they indicated more frequently that they would recycle the package. In a real-life situation, on the contrary, the importance of recycling may have been easily forgotten or overseen in situations similar to the control condition as participants were not asked to recycle the package. More research on self-reported and actual recycling behaviour is needed to unravel this interesting finding.

Our study extends previous research on design for behaviour change as it does not only show that a packaging design can promote recycling behaviour, but we potentially reveal how and under which conditions design can stimulate recycling by developing theory-based designs and by systematically testing the impact of such designs on recycling behaviour. In particular, design may make people focus on the environment, particularly when people moderately strongly to strongly endorse biospheric values and particularly when the packaging design is novel. A second way in which the context may influence recycling is therefore by making people focus on the environment.

ART STRENGTHERING INDIVIDUAL FACTORS

A third way of how the context may affect recycling behaviour is by strengthening individual factors. As a case in point, we examined the effect of experiencing an art installation that aimed to strengthen environmental self-identity and thereby to promote recycling behaviour. There has been a growing interest in using design and art to encourage pro-environmental actions (Niedderer et al., 2014; Tromp, Hekkert, & Verbeek, 2011). Yet, the question remains whether art can actually promote pro-environmental behaviour, as the effects of art on behaviour have not been systematically tested. We aimed to address this gap by examining whether art can stimulate pro-environmental actions, particularly recycling behaviour. Specifically, we aimed to test whether an art installation that was based on scientific theory on how to stimulate pro-environmental actions was effective in promoting such actions. In doing so, we followed a novel interdisciplinary approach, integrating insights from art and environmental psychology. Specifically, we as psychologists explicated different theories on factors driving pro-environmental behaviour to an artist and decided together to focus on environmental self-identity. The artist embedded this theory in the design of the art installation. The artist included other aspects as well, which were related to other theories we explained. Next, we systematically evaluated the effect of the art installation on behaviour. We proposed that an art installation that aims at strengthening environmental self-identity, an important motivational antecedent of pro-environmental behaviours, will have a positive effect on actual recycling behaviour and on intentions to engage in recycling and other pro-environmental behaviours.

Figure 4. Conceptual model tested in Chapter 5

The installation was placed on crowded public squares in two Dutch cities during two weekends and was advertised as a selfie-booth. Participants could take a free photo in the first room. The aim of letting participants take a free photo was to sensitize participants to their own identity (e.g., Beaman, Klentz, Diener, & Svanum, 1979; Wicklund & Duval, 1971). Thereafter, the main manipulation took place in the second room. In this room, among others, participants were reminded of their own past pro-environmental behaviours. A child's voice mentioned several common pro-environmental behaviours that participants have possibly engaged in. We expected that reminding them of the pro-environmental behaviours they have done would strengthen their environmental self-identity (Van der Werff, Steg, & Keizer, 2014a, 2014b).

In line with our expectations, we found that people who experienced the art installation recycled more and showed stronger intentions to recycle and to engage in other pro-environmental behaviours than people who had not experienced the art installation. Importantly, we did not only find these effects on intentions but also on actual recycling behaviour. As such, our study provides empirical evidence that art can drive pro-environmental behavioural change (cf. Eldridge, 2014, Niedderer, 2007; Verbeek, 2010).

Yet, we did not find support for our proposed process on how the art installation would affect behaviours and intentions. More precisely, a stronger environmental self-identity was related to stronger intentions to recycle and to engage in other pro-environmental actions, yet, experiencing the art installation did not strengthen one's environmental self-identity. This is an interesting finding as the artist designed the art installation with the purpose to strengthen environmental self-identity by reminding people of their past environmental behaviour. This is a strategy that proved to be effective in strengthening environmental self-identity (Van der Werff, Steg, & Keizer, 2014a, 2014b). However, the art installation included multiple components, hence, it may have elicited other processes as well. As such, different factors may have played a role in encouraging participants to engage to recycle, implying that the effect of art on behaviour cannot be pinpointed to one single factor. For example, experiencing the art installation may have triggered emotional reactions, or increased awareness of and concern about environmental problems

and concern for the future. More generally, art is considered to express a message through stimulating emotions (Freeland, 2002), and such emotional responses may have promoted recycling as well. Yet, we did not measure such alternative process variables in the current project, as the art installation mainly aimed at strengthening environmental self-identity. We wanted to keep the questionnaire as short as possible, therefore, we purposely did not include other possible items that were not part of our theoretical reasoning. We advise future research that aims at evaluating the effects of art on pro-environmental behaviour to also address other processes that can be triggered by art, such as emotional processes, next to motivational and cognitive aspects such as environmental self-identity.

In conclusion, we found that experiencing the art installation led to more actual recycling behaviour as well as to stronger intentions to engage in recycling and other pro-environmental behaviours in the future, supporting our expectations that art can drive behavioural change. Yet, we did not find that the art installation strengthened environmental self-identity, suggesting that other factors and processes may have played a role in driving the effect.

THEORETICAL IMPLICATIONS AND FUTURE DIRECTIONS

The results of this PhD dissertation highlight the importance of the context in explaining recycling behaviour. Next to individual factors, we showed that it seems crucial to consider the context when studying recycling behaviour and identified three different ways of how the context can influence recycling behaviour. In particular, the context can affect recycling by facilitating or inhibiting recycling, by making people focus on the environment and potentially by strengthening individual factors that promote recycling. Our studies suggest that it is particularly important to consider the psychological implications of contextual factors for an individual. Not contextual factors as such are important when explaining recycling behaviour but how individuals perceive these factors.

We only studied a limited set of contextual factors, namely the collection system as a factor that facilitates recycling, packaging design as a factor that makes people focus on the environment and an art installation as a factor that could strengthen individual factors. Future research could examine to what extent other contextual factors can facilitate recycling, make people focus on the environment or can strengthen individual factors. With respect to factors facilitating or inhibiting recycling, the recycling facilities people have in their homes to recycle may be a relevant contextual factor to investigate. Additionally, a packaging design that clearly conveys that it can be recycled may also facilitate recycling. Concerning contextual factors that make people focus on the environment, not only a packaging design but also recycling bins may induce the focus on the environment. Other relevant contextual factors next to an art installation that may strengthen individual factors may be a packaging design or a recycling bin. In particular, the design of a packaging or of a recycling bin may be creatively adjusted in a way that it strengthens individual factors. Testing the different processes of how the context can affect recycling behaviour with different contextual factors may allow to draw firmer conclusions regarding the robustness and the generalizability of our results that the context is crucial to consider when explaining recycling behaviour. Furthermore, we only focused on strengthening environmental self-identity as an individual factor that may be strengthened via the context. Future research could test whether the context can also affect other individual factors that are related to recycling, such as personal norms. Moreover, future research may also test the effects of different contextual factors based on different theories, targeting different pro-environmental behaviours and including multiple process variables in the questionnaire.

We investigated the interaction between individual and contextual factors, but one may also argue that different contextual factors interact with each other. The A-B-C model (Guagnano et al., 1995; Stern, 2000) proposes that individual factors are particularly related to recycling when recycling is perceived as moderately feasible, thus in the middle range of the feasibility continuum. In future research, it may be interesting to investigate whether the influence of contextual factors that make people focus on the environment also depends on the level of perceived feasibility. One may argue that contextual factors that make people focus on the environment are particularly successful in promoting recycling when recycling is in the in the middle range of the feasibility continuum. That is, when recycling is perceived as moderately feasible. When recycling is perceived as very feasible or very unfeasible, one may expect that the perceived feasibility has a strong direct influence on recycling behaviour. When recycling is perceived as very feasible, one may expect most people to recycle and when recycling is perceived as very unfeasible, one may expect that hardly no one recycles. Consequently, at the lower or upper end of the feasibility continuum, contextual factors that make people focus on the environment could be of little added value. Yet, when recycling is perceived as moderately feasible, contextual factors that make people focus on the environment may affect to what extent someone recycles or not. Future research could test whether perceived feasibility and other contextual factors, such as contextual factors that make people focus on the environment interact.

The meta-analysis revealed that individual and contextual factors were more strongly related to intentions to recycle than to self-reported recycling and particularly compared to actual recycling behaviour. To examine this further, we included in all three empirical chapters different indicators of recycling, including actual behaviour. The aim to also include measures of actual recycling behaviour next to intentions and self-reported recycling was to cross-validate our findings with different indicators. Overall, we could find similar results across different indicators of recycling, suggesting that similar individual and contextual factors explain intentions to recycle, self-reported and actual recycling behaviour. This implies that our results do not support the notion and the result of the meta-analysis that intentions can be better explained than actual recycling behaviour.

In Chapter 4 and 5, we followed a novel inter-

disciplinary approach, notably integrating insights from design, art and environmental psychology, by explicating assumptions on which factors drive pro-environmental behaviour and by embedding this in the packaging designs and in the art installation, and by systematically evaluating the effect of these on recycling behaviour. Integrating scientific theory in design and art, and evaluating the impact of the packaging designs and the art installation can contribute to a better understanding of the extent to which, how and why design and art can promote pro-environmental actions. As far as we know, we initiated one of the first collaborations between designers, artists and environmental psychologists, and showed that design and art are effective ways to stimulate recycling behaviour. Yet, interdisciplinary research projects like ours may imply a challenge as interests and approaches of different disciplines do not always match and therefore compromises are needed. Specifically, different approaches and goals of designers and artists, on the one hand, and researchers, on the other hand may complement each other but may also conflict. For example, artists take a holistic approach (Hekkert & Van Dijk, 2014; Niedderer, 2007), that may lead to designs and art pieces that entail many different concepts and ideas. Designers and artists need freedom, as stringent guidelines inhibit the creative process (Hekkert & Van Dijk, 2014). Researchers typically seek for strong experimental control to test theories (Niedderer, 2007). One may argue that to test theory-based art, one would need to solely manipulate environmental self-identity and test the effect of this in a controlled experimental setting. Yet, such an approach would not allow to truly test the effect of art, as art aims at trying out new and original ways to convey a message, combining many different aspects (Freeland, 2002).

In two chapters, we showed the positive effects of design and art on recycling behaviour. However, replications of these effects are needed in future research to be able to generalize our results. Environmental psychologists could initiate interdisciplinary collaborations with designers and artists to test the effects of other designs and art pieces, based on different theories, targeting different behaviours and evaluating the short-term as well as the long-term effects of these designs and art pieces on pro-environmental actions. On the basis of such research, design principles can be derived that can be employed by designers and artists interested in promoting behaviour change. Such insights are important to understand the potential and to increase the impact of design and artistic interventions in stimulating pro-environmental actions.

PRACTICAL IMPLICATIONS

Our studies provide important suggestions for campaign and policy makers aiming at promoting recycling behaviour. Across four chapters, we found that next to individual factors, also contextual factors can influence recycling behaviour. This result implies an important potential for policy as many contextual factors may be readily changed, thereby influencing recycling. Our results suggest that changing the context can stimulate individuals' recycling behaviour in three different ways.

First, practitioners could implement good recycling facilities as to enhance the perceived feasibility of recycling. For instance, they could simply make the use of the collection system as easy as possible. A recent meta-analysis indeed found that recycling can be promoted by establishing collection systems that are easier and more convenient to use (Varotto & Spagnolli, 2017), for example by increasing the frequency of collecting recycled waste from people's homes (Best & Kneip, 2011) or by shortening the distance to drop-off location stations (Hage, Söderholm, & Berglund, 2009; Lange, Brückner, Kröger, Beller, & Eggert, 2014). This, in turn, increases the likelihood that people experience the use of the collection system as easier and eventually perceive recycling as more feasible, which should lead to more recycling. Second, as perceptions of the collection system seem to matter, practitioners could ensure that individuals' perceptions of the ease of using a collection system are accurate. For this, communication strategies may be applied that aim at making people aware of the ease of using the collection system, such as easily accessible information on pick-up times of waste or on the nearest drop-off location.

Yet, there may be situations in which it is not possible to make the use of the collection system easier as there may be structural or economic constraints that cannot be easily overcome. For example, introducing more pick-up times or more bins can be rather costly. In situations in which it is not easy to further facilitate recycling and in situations in which people generally perceive recycling as not very feasible, our results suggest that interventions could target individual factors such as biospheric values, environmental and recycling self-identity, personal- and social norms towards recycling. Stronger biospheric values seem to be particularly related to recycling behaviour in situations in which recycling is perceived as moderately feasible. The question remains which interventions can be effective in strengthening biospheric values as biospheric values form in early childhood and thereafter are relatively difficult to change (Steg, 2016). However, as many people rather strongly endorse biospheric values (Bouman & Steg, 2019), interventions could be implemented that make people focus on their biospheric values, thereby supporting people's biospheric values and increasing the likelihood that they act upon their biospheric values. This can be done by stressing the positive consequences of recycling for the environment, thus strengthening the extent to which recycling is associated with benefits for the environment (cf. Steg et al., 2014; Ruepert et al., 2017). Indeed, the results of Chapter 4 suggest that design, such as a packaging design, can be developed in a way that it makes people focus more on the environment. Practitioners may also change other cues with the aim to make people focus on the environment, such as the design of recycling bins. The design of these bins, for example, may stress the positive consequences of recycling for the environment. This, in turn, may lead to more recycling. Interestingly, making people focus on the environment seems to be particularly successful when people moderately strongly to strongly endorse biospheric values. This implies a great opportunity as a design that aims at making people focus on the environment does not only

lead to more recycling among individuals with strong biospheric values who generally are more likely to engage in pro-environmental behaviours anyway, but also among people with moderately strong biospheric values who do not consistently engage in recycling and other pro-environmental behaviours. Hence, practitioners can promote recycling by making people focus on the environment also among individuals who do not consistently engage in recycling.

A third way of how practitioners may promote recycling behaviour may be to use new ways to convey a message, such as using art. A characteristic of art is that art is not restricted to familiar notions, art can create original and new ways to convey a message (Freeland, 2002), and there the power of art lies. Practitioners can place art pieces, such as an art installation, in public space and passers-by can experience these. Extending this approach, practitioners may also design art pieces that individuals can put in their houses – the place where most of the recycling takes place. In that way, art can encourage recycling in daily life as people would be exposed to the art pieces whenever they need to recycle at home. Examples of art to promote recycling at home may be redesigned recycling bins or redesigned recycling facilities on the streets. For creating such art pieces, a collaboration between artists and environmental psychologists may be of added value. Besides the aesthetic aspects that the artist can bring in the design, the art installation could integrate scientific theory on important antecedents of pro-environmental behaviours.

Following the notion of the IFEP model (Steg et al., 2014; Steg et al., 2016), we proposed that both individual and contextual factors and their interaction can influence recycling behaviour. We first conducted a meta-analysis to examine the relative importance of individual and contextual factors on recycling and found that both individual and contextual factors are relevant in explaining recycling. However, contextual factors and their interaction with individual factors were understudied. To address this gap, we studied three ways of how contextual factors can influence recycling behaviour. First, we addressed whether the context can influence recycling by facilitating or inhibiting recycling. In this respect, we examined individuals' perceptions of the ease of using the collection system. We found that the easier individuals perceived the collection system to use, the more feasible they perceived recycling to be, which led to more recycling. Biospheric values particularly influenced recycling when recycling was perceived as not very feasible. Second, we argued that the context can influence recycling by making people focus on the environment. We found that a packaging design that made people focus on the environment could stimulate recycling behaviour, particularly among individuals with moderately strong to strong biospheric values and particularly when novel designs were used. Third, we reasoned that the context can stimulate recycling by strengthening individual factors and found that an art installation that aimed to strengthen environmental self-identity promoted recycling behaviour. Yet, we could not find support for our proposed underlying process, suggesting that the art installation may have triggered other motivational processes, such as emotions. In summation, this dissertation studied three ways of how contextual factors can influence recycling. By systematically investigating the influence of contextual factors and their interaction with biospheric values, this dissertation addresses an important gap in existing literature on recycling and highlights the importance of considering contextual factors in explaining recycling behaviour, next to individual factors.